April 28, 1942. N. CHIRELSTEIN 2,281,478

ASSEMBLING MACHINE

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Fig. 1

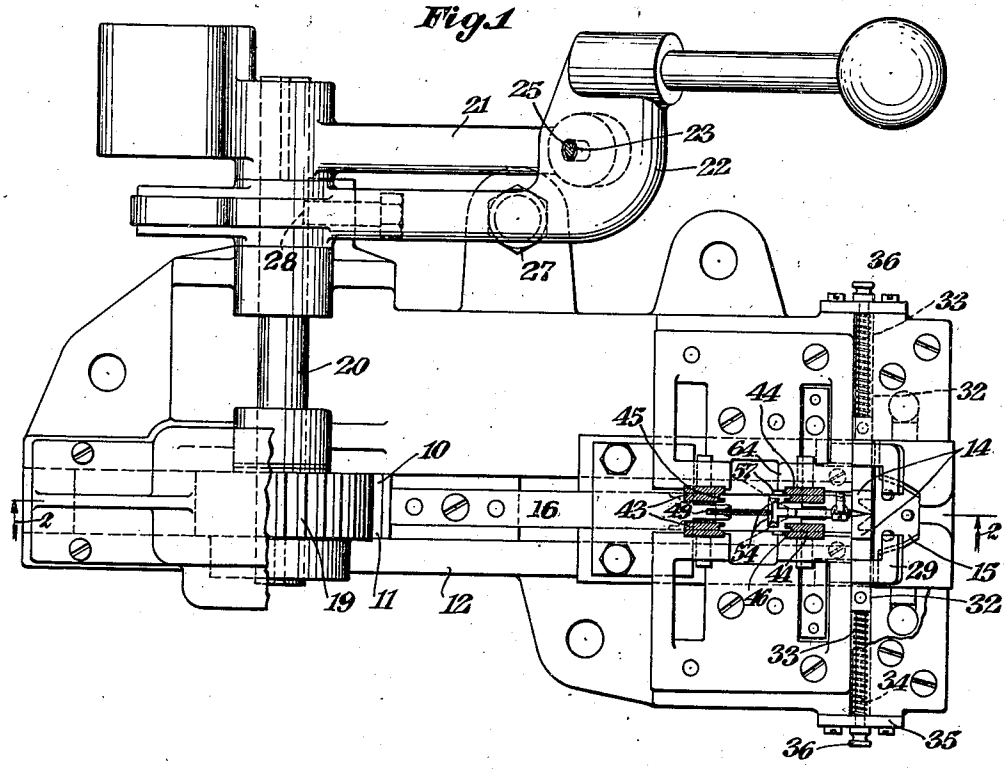
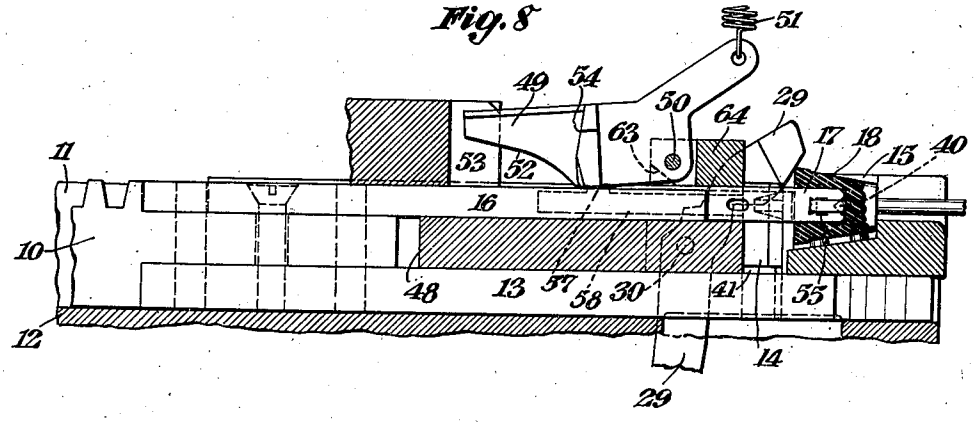


Fig. 8



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Fig. 2

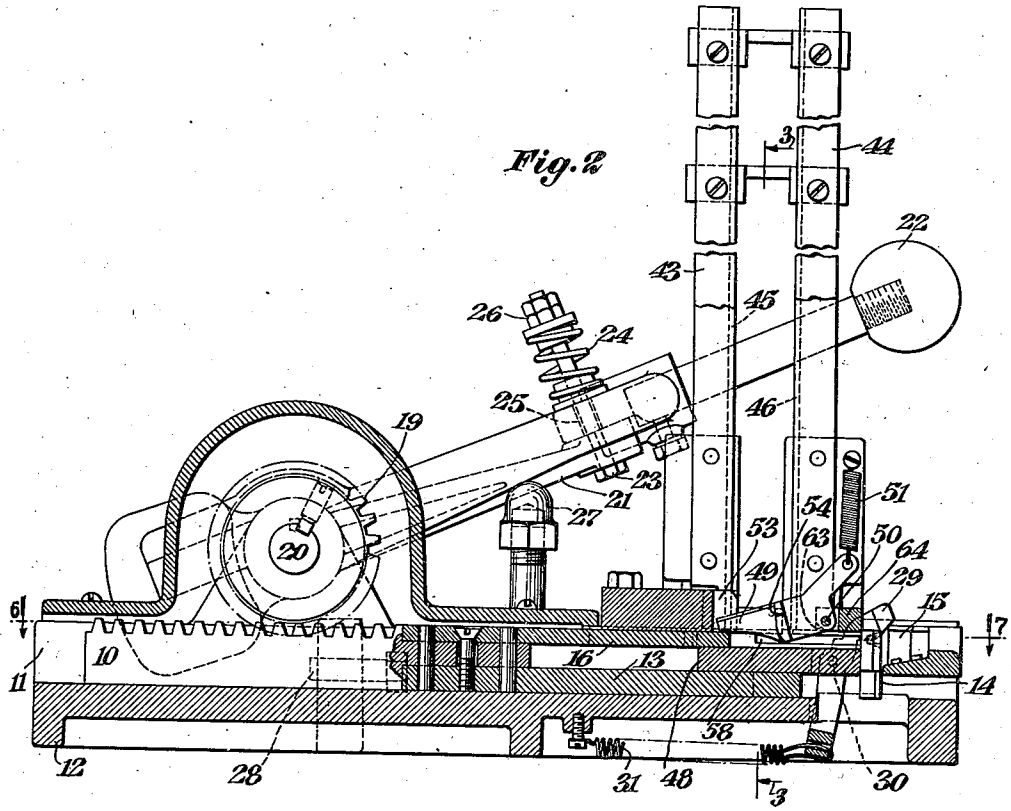


Fig. 3

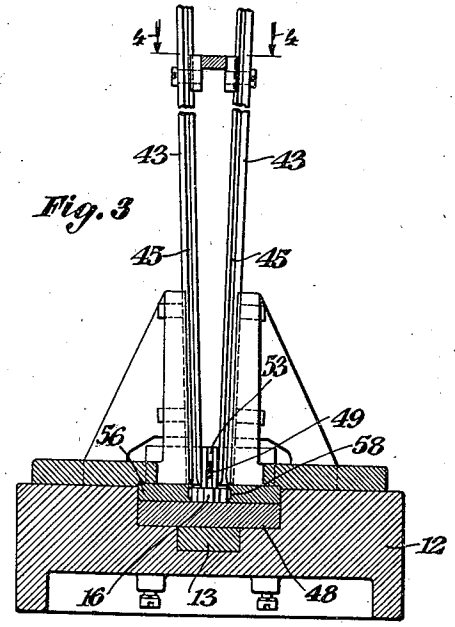


Fig. 4

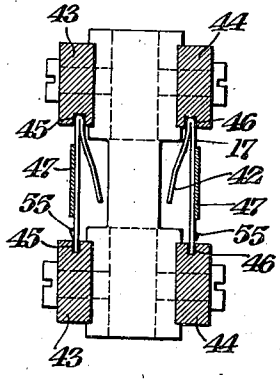
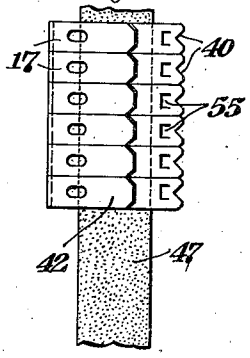


Fig. 5



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ASSEMBLING MACHINE

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Fig. 6

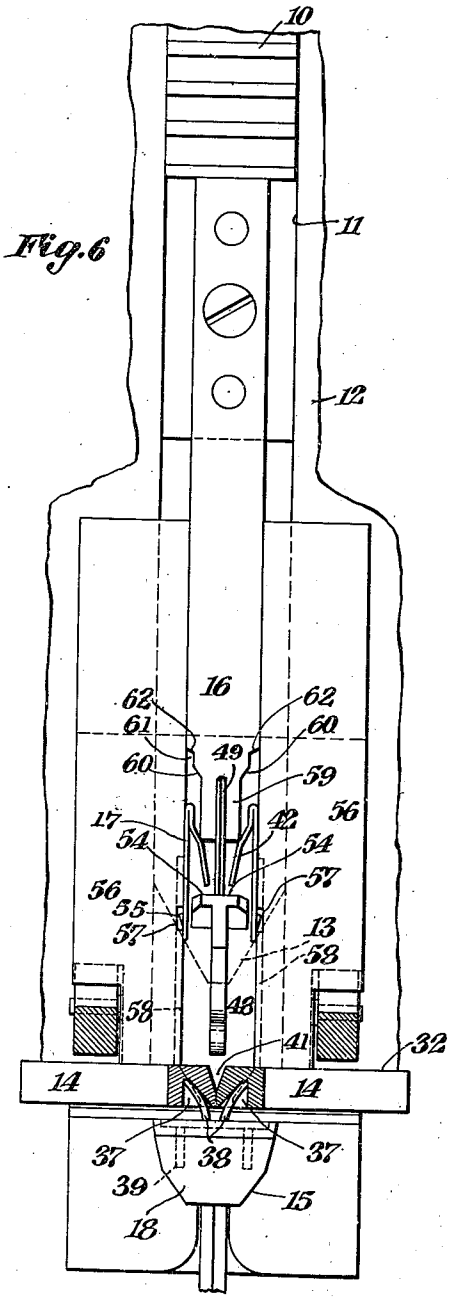
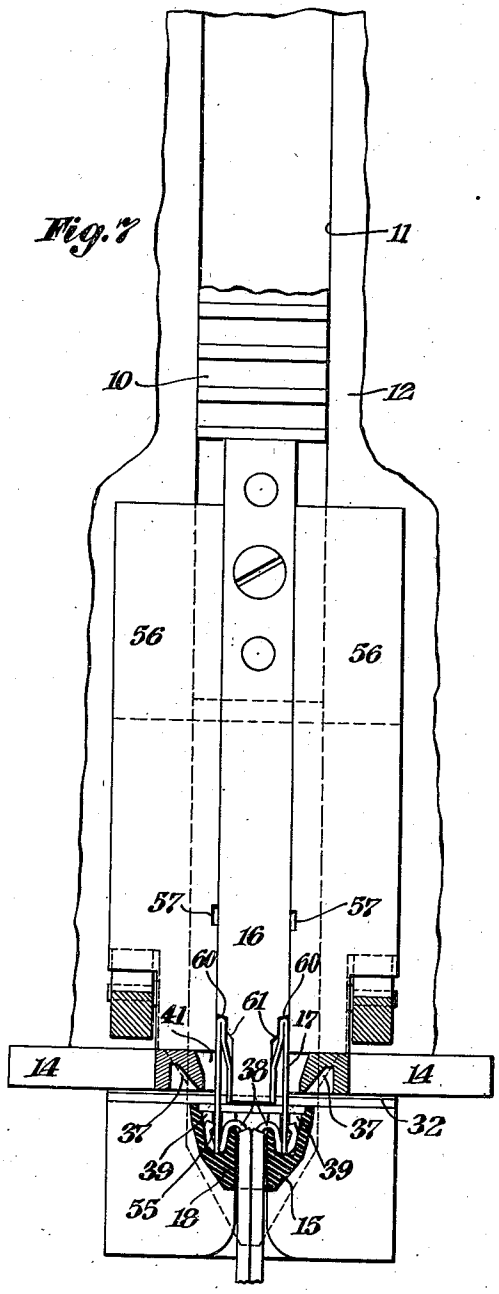


Fig. 7



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UNITED STATES PATENT OFFICE

2,281,478

ASSEMBLING MACHINE

Nathan Chirelstein, Chicago, Ill.

Application August 31, 1939, Serial No. 292,843

8 Claims. (Cl. 29—84)

The invention here disclosed relates to the assembling of electric attachment plug caps and the like.

The objects of the invention are to provide a machine for assembling the wires and contact blades in the body or base members of attachment plug caps and the like, which will be wholly reliable and practical in every way, rapid in operation, automatic in character, simple and easy to operate and generally efficient for the purpose intended.

Further objects and the novel features of invention by which all objects are attained are set forth or will be clear from the following specification.

The drawings accompanying and forming part of the specification illustrate one of the practical commercial embodiments of the invention. The structure however may be modified and changed all within the true spirit and scope of the invention as hereinafter defined and broadly claimed.

Fig. 1 is a broken plan view partly in section of one of the assembling machines.

Fig. 2 is a broken vertical sectional view on substantially the plane of line 2—2 of Fig. 1.

Fig. 3 is a broken vertical sectional view as on substantially the plane of line 3—3 of Fig. 2.

Fig. 4 is an enlarged plan and sectional view of the blade magazine as on line 4—4 of Fig. 3.

Fig. 5 is a broken detail illustrating the manner in which the contact blades may be temporarily connected by Scotch tape, thus to form a continuous strip readily insertable as such in the guides of the magazine.

Figs. 6 and 7 are broken part sectional enlarged views on substantially the line 6—7 of Fig. 2, illustrating successive stages in the driving of the contact blades over the wire ends in an attachment plug cap.

Fig. 8 is an enlarged broken sectional detail similar to Fig. 2, illustrating final position of the parts in driving the blades into the cap.

In Figs. 1 and 2, the machine is shown as comprising a rack slide 10, operating in a guide 11, in a base 12, and carrying at its active, forward end a lower blade 13, for forcing open a pair of sliding doors 14, in front of the plug body holding socket 15, and an upper blade 16, for driving the contact blades 17, into the plug cap 18, seated in the holder (Figs. 7 and 8).

The rack 10, is shown operated by pinion 19, on a shaft 20, which has fixed to it a rock lever 21, yieldingly held to a hand lever 22, pivotally mounted on the shaft by bolt 23, and spring 24. This bolt is shown in Fig. 2, as extending up through rock lever 21, and projecting loosely at 25, through the hand lever 22, and the spring 24, is shown as engaged about the upper portion of the bolt and adjustably tensioned against the hand lever by abutment nuts 26. Movement of the hand lever in opposite directions is determined by the adjustable stops 27, 28, Fig. 2, and the spring provides a yielding connection for cushioning the action of the contact blade driving slide and for enabling this slide to yieldingly accommodate itself to slight variations in the seating of the blades in the cap body.

The plug caps 18, are shown in Figs. 2 and 8, as yieldingly retained in the holder socket 15, by hold-down fingers 29, pivoted at 30, and rocked in the retaining direction by springs 31.

The doors 14 are shown as sliding in a transverse guideway 32, in front of the cap holder and as yieldingly pressed toward each other by springs 33, surrounding the rods 34, attached to said doors and slidingly guided through plates 35. These plates provide abutments for the springs 33, and the heads 36, on the outer ends of the guide rods provide fingerholds by which the doors can be manually separated, Fig. 1.

The outer faces of doors 14, are shown in Fig. 6, as having divergent seats 37, to receive and spread the ends of wires 38, entered therein. These seats are made deep enough to actually retain the ends of such wires to thus further separate the wires as the doors open up to admit the blades. This spreading is sufficient to carry the ends of the wires outward over the blade receiving sockets 39, so that the blades when driven into the sockets will engage and force said wires into the sockets as in Fig. 7. To cause the blades to center and hold the wires so engaged, the ends of the blades are shown as notched at 40, Figs. 5 and 8.

The opposite inner faces of the sliding doors are shown as having complemental bevel cavities 41, to receive the more or less pointed cam-like front end of the lower slide member 13. The machine of the present disclosure is designed for handling contact blades of the so-called "spring action" type, which differ from the ordinary straight blades in having the return bent end portions 42. The parts are accordingly shown designed to accommodate and operate on blades of this particular type.

To hold a supply of the blades in position for successive use, a special magazine is provided in the illustration, consisting of the opposite pairs of upright guide bars 43, 44, having each pair, the opposing shallow guide grooves 45, 46, slidingly receiving the end portions of the blades. The blades are placed in these magazine guides with the spring tips of opposite blades at the inside, opposing each other, as they do in the final assembly.

To facilitate insertion of the stacks of blades in the opposed holders of the magazine, said blades may be temporarily connected in edge-to-edge relation in a continuous strip by means of adhesive, so-called Scotch tape 47. This tape is

engaged over the back or straight outer faces of the blades which are at the outside, when in the magazine, so that a whole strip of the blades may be inserted in the open top of the magazine, using the tape as a convenient handle and the tape then be stripped off, tearing it down from the top, so as to leave all the blades of the inserted strip, seated edge-on-edge in the magazine guides. These guides are shown flared upwardly and separated more widely at the top to facilitate such handling of the blades, inspection of the parts, etc.

The lowermost pair of blades in the guide channels rest on a supporting shelf **48**, at the foot of the magazine guides, disposed between the spaced upper feed slide **16**, and gate opening cam slide **13**.

To hold the lower pair of blades which have dropped from the lower ends of the magazine guides, terminating at the upper feed slide, a separator is provided in the form of a separator blade **49**, pivoted at **50**, and projecting into the space between the two magazine guides. A spring **51**, acting on the outer end rocks the separator blade downwardly into projected position and the lower edge of the blade is curved as a cam **52**, to ride the upper edge of the advancing feed slide, thus to effect lifting of the separator in time to clear the advancing contact blades. The forward end of the separator is shielded from the contact blades by working in a guide groove **53**, at the far side of the magazine.

The blade separator **49** also, as shown in Figs. 1, 2 and 8, has transverse shoulders **54**, at opposite sides of the same, which in the position shown in Fig. 6 serve as temporary stops engaged by the spring tongues of the blades, to restrain them while the feed slide is compressing these spring tips and getting ready to drive the blades into the plug cap.

Another special feature of the contact blades shown in the present disclosure is that they are provided with outwardly struck lugs or tongues **55**, designed to engage and interlock over the wires as the blades are driven into the plug cap. To accommodate these outstruck lugs, the feed slide guides **56**, are notched at **57**, downward to their mid-portions and then grooved at **58**, forwardly to the ends of such guides. The entry of the contact lugs into these notches and grooves is of assistance in properly controlling and directing the blades.

In the fully retracted position, the feed slide may be wholly to the rear of the lower pair of contact blades. In the first part of the forward movement, the reduced end portion **59** enters between the inwardly extending spring portions **42** of the blades and begins to flatten them outwardly. The spring frictional engagement thus effected is sufficient to carry the blades along with the slide until the ends of the spring portions abut the side shoulders **54** of the separator. Inclined shoulders **60** at the back of the reduced portion **59** hold and guide the doubled ends of the blades so that, as the separator then raises, these doubled ends of the blades can enter the reduced channels **61** at the back of inclined shoulders **60**. At approximately this time the forward ends of the straight portions of the blades engage the inside faces of the sliding doors **14**, retarding the blades while the final drive shoulders **62** come up into position just in back of the doubled ends of the blades. Then as the doors open, the blades are fully in position for the final shoulders **62** to drive the blades on past the opened doors, over the spread wire ends, into the sockets **39** in the plug cap.

The spring blades are thus contracted, guided and held at all times and directed and driven positively over the wire ends, into the plug cap.

The reduced forward end **59** of the feed slide as it starts to compress the lower pair of blades, passes beneath the spread ends of the next above pair of blades and thus acts as a separator to strip the lower blades away from the stack of blades in the magazine.

To further guide the outer forward ends of the contact blades, downwardly inclined notches **63**, Figs. 2 and 8, are shown provided in the overstanding bridge **64**, which the blades pass beneath in entering the sockets in the plug cap.

The weight of the superposed contact blades is ordinarily sufficient to cause the blades to feed smoothly downward in the magazine guides, onto the supporting shelf at the foot of the magazine. Temporarily, the blades are supported by the lower pair resting on the shelf but as the feed slide advances and begins compressing the lower pair, the top surface of the slide passes beneath the spread portions of the superposed blades and continuing, passes fully beneath the latter, thus freeing the lower blades from all superposed weight. The plunger by compressing the reversely bent spring ends, holds the blades backed firmly against the guides **56** and thus holds the blades under full control in the blade driving action.

The form of the holder **15** will vary to suit the formation of the base of the particular wiring device being handled and the structure and arrangement of other parts of the machine may vary to suit particular requirements, all within the scope of the invention. Thus the formation of the magazine may vary and the strips of tape connected blades be wound in rolls or reels and such reels be supported at opposite sides of the magazine guides, with the forward ends of such strips led downward into such guides.

What is claimed is:

1. A machine for assembling conductor wires and contact blades in attachment plug caps, comprising a guide for the contact blades, means for positioning a plug cap at the end of said guide in position to receive contact blades directed by said guide, means for driving contact blades in said guide into a plug cap located by said positioning means, relatively separable doors intercepting said guide in front of said plug cap positioning means, said doors having wire retaining means located to receive the ends of wires extended through a plug cap located by said plug cap positioning means and means for effecting relative separation of said doors to spread the ends of wires engaged with said wire retaining means and in time to pass contact blades advanced by said contact blade driving means.

2. A machine for assembling conductor wires and contact blades in attachment plug caps, comprising a guide for the contact blades, means for positioning a plug cap at the end of said guide in position to receive contact blades directed by said guide, means for driving contact blades in said guide into a plug cap located by said positioning means, relatively separable doors intercepting said guide in front of said plug cap positioning means, said doors having wire retaining means located to receive the ends of wires extended through a plug cap located by said plug cap poistioning means, means for effecting relative separation of said doors to spread the ends

of wires engaged with said wire retaining means and in time to pass contact blades advanced by said contact blade driving means, said doors being in the form of slides opposed end to end and disposed substantially transversely of said contact blade guide, a transverse guideway being provided for said slides in front of said plug cap positioning means and said means for effecting relative separation of said doors including a spreader cam entering between the opposing ends of said slides and spring means for shifting said slides in the closing direction.

3. A machine for assembling conductor wires and contact blades in attachment plug caps, comprising a guide for the contact blades, means for positioning a plug cap at the end of said guide in position to receive contact blades directed by said guide, means for driving contact blades in said guide into a plug cap located by said positioning means, relatively separable doors intercepting said guide in front of said plug cap positioning means, said doors having wire retaining means located to receive the ends of wires extended through a plug cap located by said plug cap positioning means, means for effecting relative separation of said doors to spread the ends of wires engaged with said wire retaining means and in time to pass contact blades advanced by said contact blade driving means, a blade separator movably supported to enter the contact blade guide between the blades being driven and means for automatically retracting said blade separator clear of the blades being driven.

4. A machine for assembling conductor wires and contact blades in attachment plug caps, comprising a guide for the contact blades, means for positioning a plug cap at the end of said guide in position to receive contact blades directed by said guide, means for driving contact blades in said guide into a plug cap located by said positioning means, relatively separable doors intercepting said guide in front of said plug cap positioning means, said doors having wire retaining means located to receive the ends of wires extended through a plug cap located by said plug cap positioning means, means for effecting relative separation of said doors to spread the ends of wires engaged with said wire retaining means and in time to pass contact blades advanced by said contact blade driving means and a contact blade separating member pivotally mounted over said contact blade guide, said blade driving means including a plunger operable in said guide and engageable with said pivotally mounted blade separator to rock the same clear of the blades being driven.

5. A machine for assembling conductor wires and contact blades in attachment plug caps, comprising a guide for the contact blades, means for positioning a plug cap at the end of said guide in position to receive contact blades directed by said guide, means for driving contact blades in said guide into a plug cap located by said positioning means, a relatively separable doors intercepting said guide in front of said plug cap positioning means, said doors having wire retaining means located to receive the ends of wires extended through a plug cap located by said plug cap positioning means, means for effecting relative separation of said doors to spread the ends of wires engaged with said wire retaining means and in time to pass contact blades advanced by said contact blade driving means, said doors being in the form of slides opposed end to end, a guideway being provided for said slides disposed substantially transversely of said contact blade guide and said wire end retainers being in the form of wire end receiving pockets in the face of the slides disposed toward said plug cap positioning means.

6. A machine for assembling conductor wires and contact blades in attachment plug caps, comprising a guide for the contact blades, means for positioning a plug cap at the end of said guide in position to receive contact blades directed by said guide, means for driving contact blades in said guide into a plug cap located by said positioning means, relatively separable doors intercepting said guide in front of said plug cap positioning means, said doors having wire retaining means located to receive the ends of wires extended through a plug cap located by said plug cap positioning means, means for effecting relative separation of said doors to spread the ends of wires engaged with said wire retaining means and in time to pass contact blades advanced by said contact blade driving means, a contact blade supporting shelf forming the bottom of said contact blade guide and said door operating means including a second plunger operating beneath said contact blade supporting shelf.

7. A machine for assembling conductor wires and contact blades in attachment plug caps, comprising a guide for the contact blades, means for positioning a plug cap at the end of said guide in position to receive contact blades directed by said guide, means for driving contact blades in said guide into a plug cap located by said positioning means, relatively separable doors intercepting said guide in front of said plug cap positioning means, said doors having wire retaing means located to receive the ends of wires extended through a plug cap located by said plug cap positioning means, means for effecting relative separation of said doors to spread the ends of wires engaged with said wire retaining means and in time to pass contact blades advanced by said contact blade driving means, said contact blade guide being grooved along opposite sides to receive and guide projecting lugs on the contact blades and entry notches opening into said grooves for admitting said lugs into said grooves.

8. A machine for assembling contact blades in attachment plug caps, comprising in combination a longitudinally extending guide, a plunger operating in said guide and provided with contact blade engaging means adapted to push contact blades into a plug located adjacent the end of said guideway, a transverse guideway at the end of said longitudinal guideway, doors slidably mounted in opposed end to end relation in said transverse guideway, means on the opposed end portions of said doors adapted to operatively engage the ends of wires extended through a plug and, upon the movement of said doors, to locate the wire ends in operative position with respect to the advancing contact blades and cam means on said slide and entered between said doors for sliding said doors apart.

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